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Sunlight Readable LCD!

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DURApixel™ by LITEMAX Wide Temp LED Backlight

RoHS·WEEE LITEMAX COMPLIANT

LITEMAX DLF/DLH1268

Sunlight Readable 12.1” LED B/L LCD

User Manual

(1st Edition 2011/5/5)

All information is subject to change without notice.

Approved by	Checked by	Prepared by

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RECORD OF REVISION

Version and Date	Page	Old Description	New Description	Remark
May,5,2011	all		Preliminary Release	

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Contents

Contents **3**
1.0 GENERAL DESCRIPTION **4**
1.1 FEATURES 4
1.2 GENERAL SPECIFICATIONS 4
1.3 ABSOLUTE MAXIMUM RATINGS 4
2.0 Electrical characteristics **6**
3.0 SIGNAL Characteristic **8**
4.0 TIMING Characteristics **11**
5.0 CONNECTOR and PIN ASSIGNMENT **13**
6.0 OPTICAL SPECIFICATION **14**
7.0 LED DRIVING BOARD SPECIFICATIONS **15**
8.0 MECHANICAL DRAWING **18**
9.0 PRECAUTIONS **20**

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1.0 GENERAL DESCRIPTION

DLF/DLH1268 is 12.1” wide color TFT-LCD module as active switching devices with 1,600nits LED backlight powered by Durapixel™ technology. The display supports the XGA (1024(H) x 768(V)) screen format and 16.2M colors (RGB 8-bits) or 262K colors (RGB 6-bits). All input signals are LVDS interface compatible.

1.1 FEATURES

- Sunlight Readable
- LED Backlight
- XGA(1024x768) High Definition
- High Shock & Vibration Resistance
- Low Power Consumption
- High Uniformity
- Low EMI Noise
- Wide Dimming
- Wide Temperature(-30°C~-85°C)
- Life Expectancy

1.2 GENERAL SPECIFICATIONS

Model No.	DLF1268	DLH1268
Description	12.1” TFT LCD, LED Backlight 1600nits,XGA	
Display Area (mm)	245.76(H) x 184.32(V) mm	
Brightness	1600 cd/m^2	
Resolution	1024x768 (XGA)	
Contrast Ratio	700 : 1	
Pixel Pitch (mm)	0.24(H) x 0.24(V)	
Viewing Angle	+80°~-80°(H), +80°~-80°(V)	
Display Colors	16.2M	
Response Time (Typical)	35ms	
Power Consumption	11.3W	
Dimensions (mm)	272x204.6x12.5mm	
Weight (Net)	0.5kg	

1.3 ABSOLUTE MAXIMUM RATINGS

ABSOLUTE RATINGS OF LCD Module

Item	Symbol	Min	Max	Unit
Logic/LCD Drive Voltage	Vin	-0.3	+3.6	[Volt]

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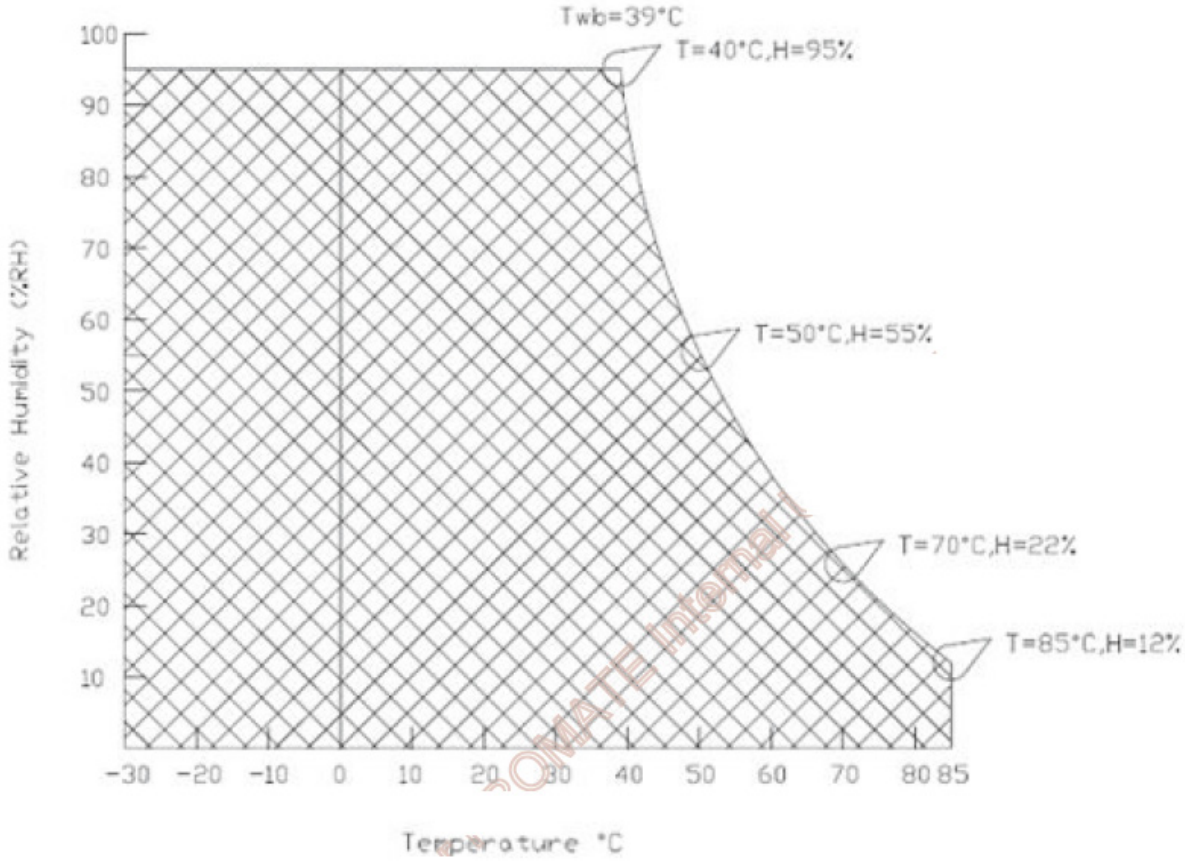
TFT LCD ENVIRONMENTAL Specification

Item	Symbol	Min	Max	Unit
Operating Temperature	TOP	-30	+85	[°C]
Operation Humidity	HOP	5	90	[%RH]
Storage Temperature	TST	-30	+85	[°C]
Storage Humidity	HST	5	90	[%RH]

Note: Maximum Web-Bulb should be 39°C and no condensation



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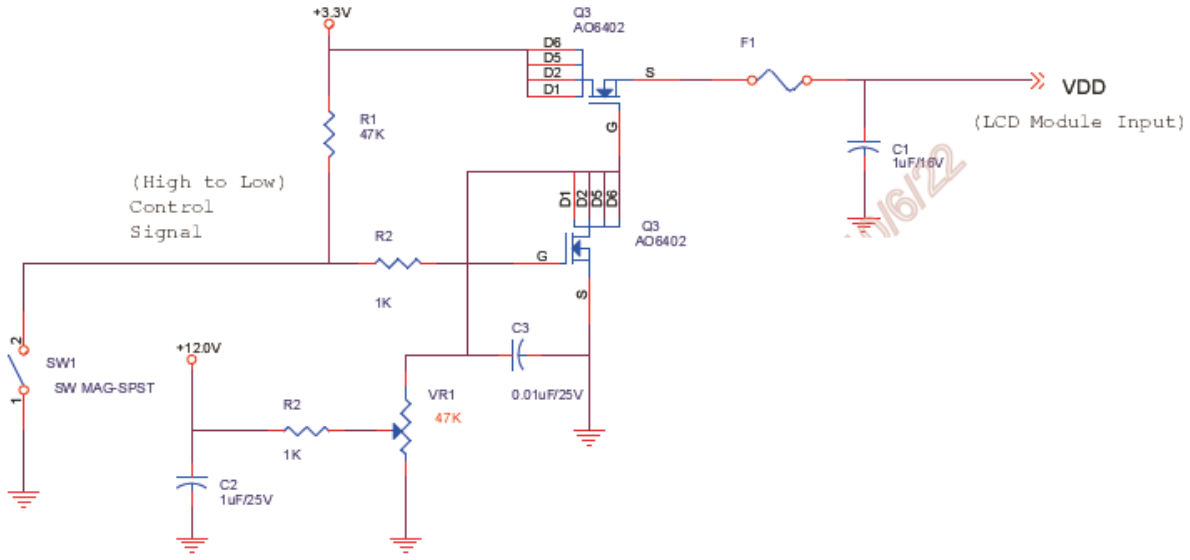
2.0 Electrical characteristics

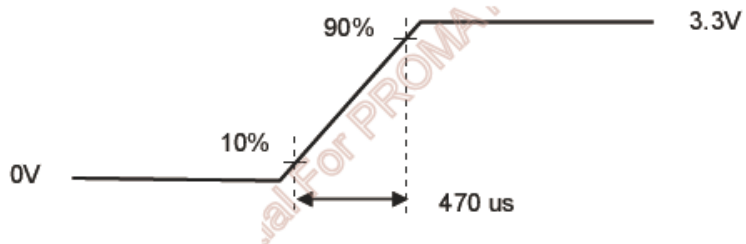
TFT LCD Module Power Specification

Input power specifications are as following:

Symbol	Parameter	Min	Typ	Max	Units	Remark
VDD	Logic/LCD Input Voltage	3.0	3.3	3.6	[Volt]	
I_{VDD}	LCD Input Current	-	590	710	[mA]	VDD=3.3V at 60 HZ, all Black Pattern
P_{VDD}	LCD Power comsumption	-	1.95	2.34	[Watt]	VDD=3.3V at 60 HZ, all Black Pattern
$I_{rush\ LCD}$	LCD Inrush Current	-	-	3	[A]	Note 1; VDD=3.3V Black Pattern, Rising time=470us
VDD_{rp}	Allowable Logic/LCD Drive Ripple Voltage	-	-	100	[mV] p-p	VDD=3.3V at 60 HZ, all Black Pattern

Note: Measurement conditions:





VDD rising time

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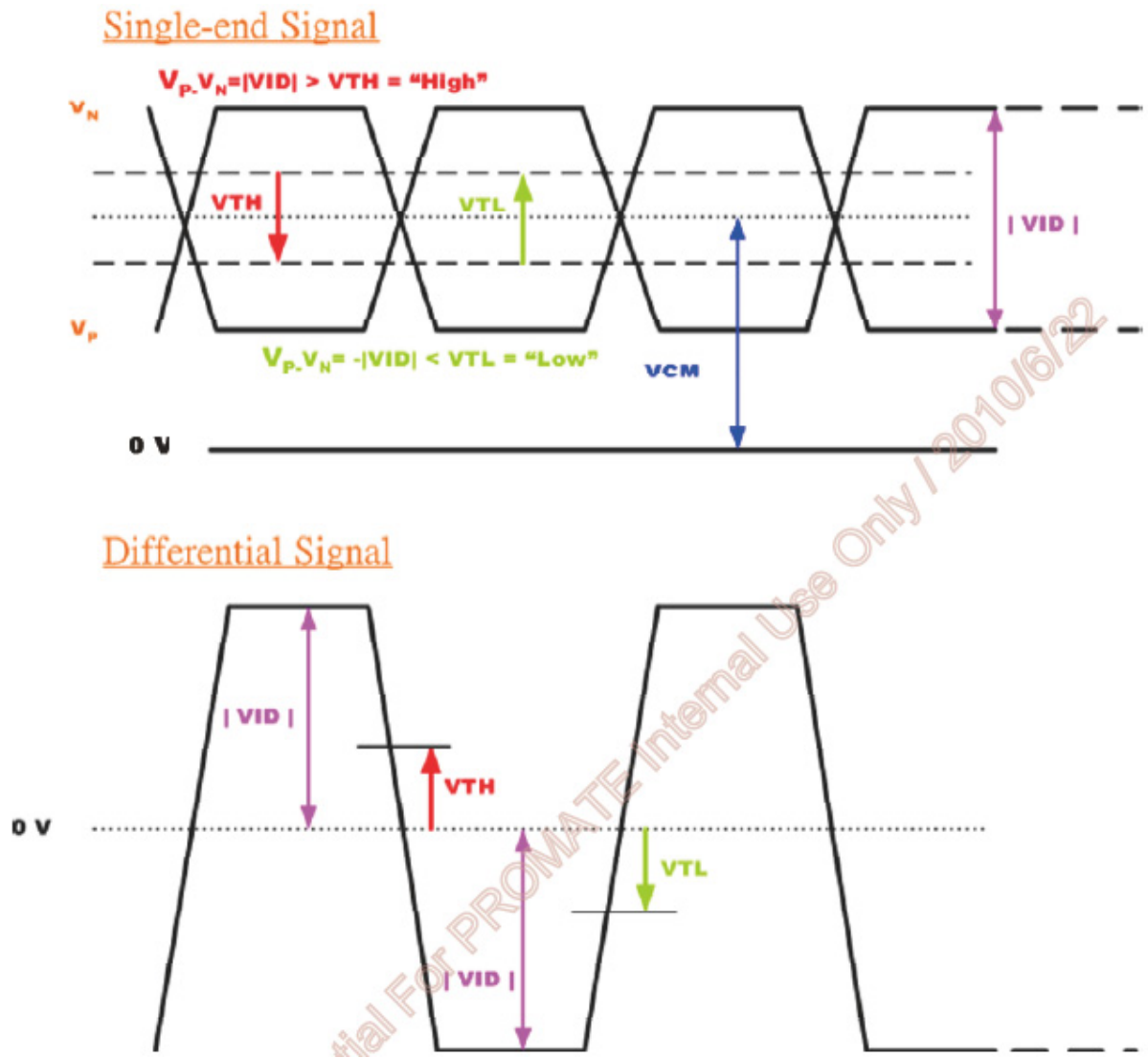
Signal Electrical Characteristics

Input signals shall be low or Hi-Z state when VDD is off. Each signal characteristics are as follows:

Symbol	Item	Min.	Typ.	Max.	Unit	Remark
VTH	Differential Input High Threshold	-	-	100	[mV]	VCM=1.2V
VTL	Differential Input Low Threshold	100	-	-	[mV]	VCM=1.2V
| VID |	Input Differential Voltage	100	400	600	[mV]	
VICM	Differential Input Common Mode Voltage	1.15	1.2	1.45	[V]	VTH/VTL=+-100mV

Note: LVDS Signal Waveform



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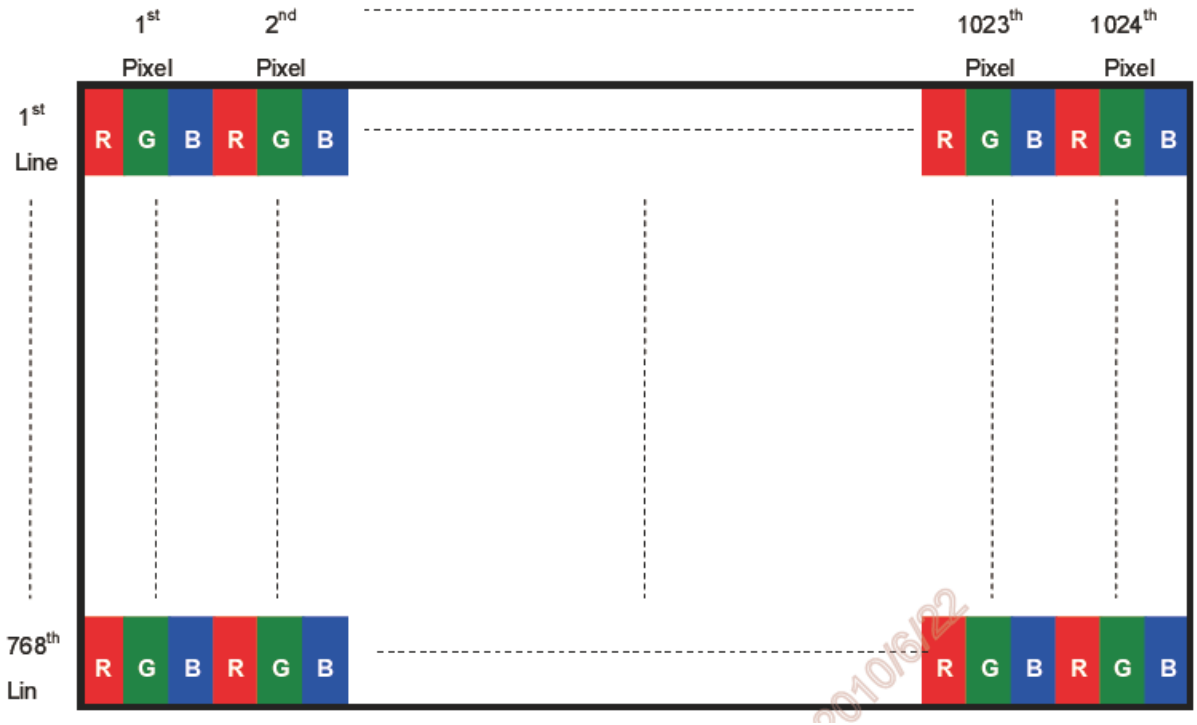
3.0 SIGNAL Characteristic

PIXEL FORMAT IMAGE



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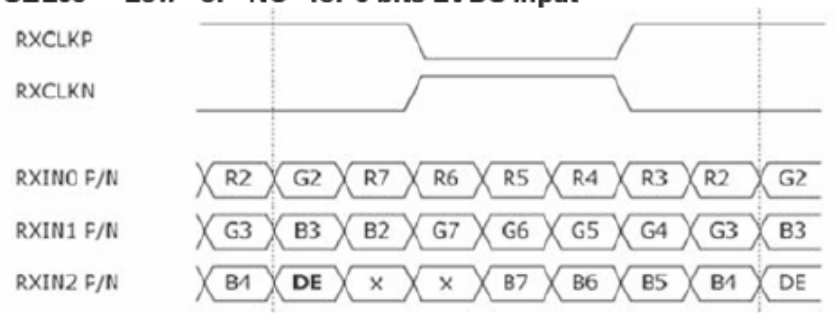
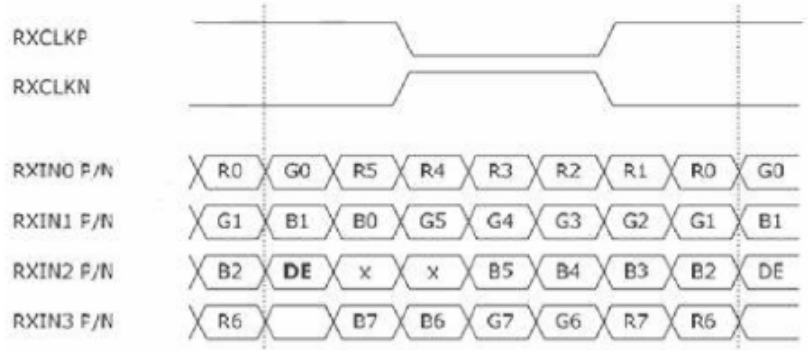
The input data format:

SEL68 ="Low" or "NC" for 6 bits LVDS Input



SEL68 = "High" for 8 bits LVDS Input


RXCLKP
RXCLKN
RXIN0 P/N
R0 G0 R5 R4 R3 R2 R1 R0 G0
RXIN1 P/N
G1 B1 B0 G5 G4 G3 G2 G1 B1
RXIN2 P/N
B2 DE x x B5 B4 B3 B2 DE
RXIN3 P/N
R6 B7 B6 G7 G6 R7 R6

Note1: Please follow PSWG.
Note2: R/G/B data 7:MSB, R/G/B data 0:LSB

Signal Name	Description	
+RED5(R5) +RED4(R4) +RED3(R3) +RED2(R2) +RED1(R1) +RED0(R0)	Red Data 5 (MSB) Red Data 4 Red Data 3 Red Data 2 Red Data 1 Red Data 0 (LSB) Red-pixel Data	Red-pixel Data Each red pixel's brightness data consists of these 6 bits pixel data.
+GREEN5(G5) +GREEN4(G4) +GREEN3(G3) +GREEN2(G2) +GREEN1(G1) +GREEN0(G0)	Green Data 5 (MSB) Green Data 4 Green Data 3 Green Data 2 Green Data 1 Green Data 0 (LSB) Green-pixel Data	Green-pixel Data Each green pixel's brightness data consists of these 6 bits pixel data.
+BLUE5(B5) +BLUE4(B4) +BLUE3(B3) +BLUE2(B2) +BLUE1(B1) +BLUE0(B0)	Blue Data 5 (MSB) Blue Data 4 Blue Data 3 Blue Data 2 Blue Data 1 Blue Data 0 (LSB) Blue-pixel Data	Blue-pixel Data Each blue pixel's brightness data consists of these 6 bits pixel data.
CLK	Data Clock	The typical frequency is 65MHz. The signal is used to strobe the pixel data and DE signals. All pixel data shall be valid at the falling edge when the DE signal is high.
DE	Display Timing	This signal is strobed at the falling edge of CLK. When the signal is high, the pixel data shall be valid to be displayed.

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Note: Output signals from any system shall be low or Hi-Z state when VDD is off.

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Signal Description

The module using a LVDS receiver embaded in AUO's ASIC. LVDS is a differential signal technology for LCD interface and high-speed data transfer device.

Input Signal Interface		
Pin No.	**Symbol**	**Description**
1	VDD	Power Supply, 3.3V (typical)
2	VDD	Power Supply, 3.3V (typical)
3	GND	Ground
4	SEL68	6/ 8bits LVDS data input selection [H: 8bits L/NC: 6bit] *Note4
5	RIN0-	LVDS receiver signal channel 0
6	RIN0+	LVDS Differential Data Input (R0, R1, R2, R3, R4, R5, G0)
7	GND	Ground
8	RIN1-	LVDS receiver signal channel 1
9	RIN1+	LVDS Differential Data Input (G1, G2, G3, G4, G5, B0, B1)
10	GND	Ground
11	RIN2-	LVDS receiver signal channel 2
12	RIN2+	LVDS Differential Data Input (B2, B3, B4, B5, HS, VS, DE)
13	GND	Ground
14	CLKIN-	LVDS receiver signal clock
15	CLKIN+	
16	GND	Ground
17	RIN3-	LVDS receiver signal channel 3, NC for 6 bit LVDS Input. *Note5
18	RIN3+	LVDS Differential Data Input (R6, R7, G6, G7, B6, B7, RSV)
19	RSV	Reverse Scan Function [H: Enable; L/NC: Disable]
20	NC/GND	Reserved for AUO internal test. Please treat it as NC.

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Note 1: Input Signals shall be in low status when VDD is off.
Note 2: High stands for "3.3V", Low stands for "0V", NC stands for "No Connection".
Note 3: RSV stands for "Reserved".
Note 4: Input signals shall be in low status when VDD is off.
Note 5: If 6 bits mode, please keep the Pin 17 & Pin 18 NC or make sure that the Voltage of Pin 17 is always higher than the Voltage of Pin 18.

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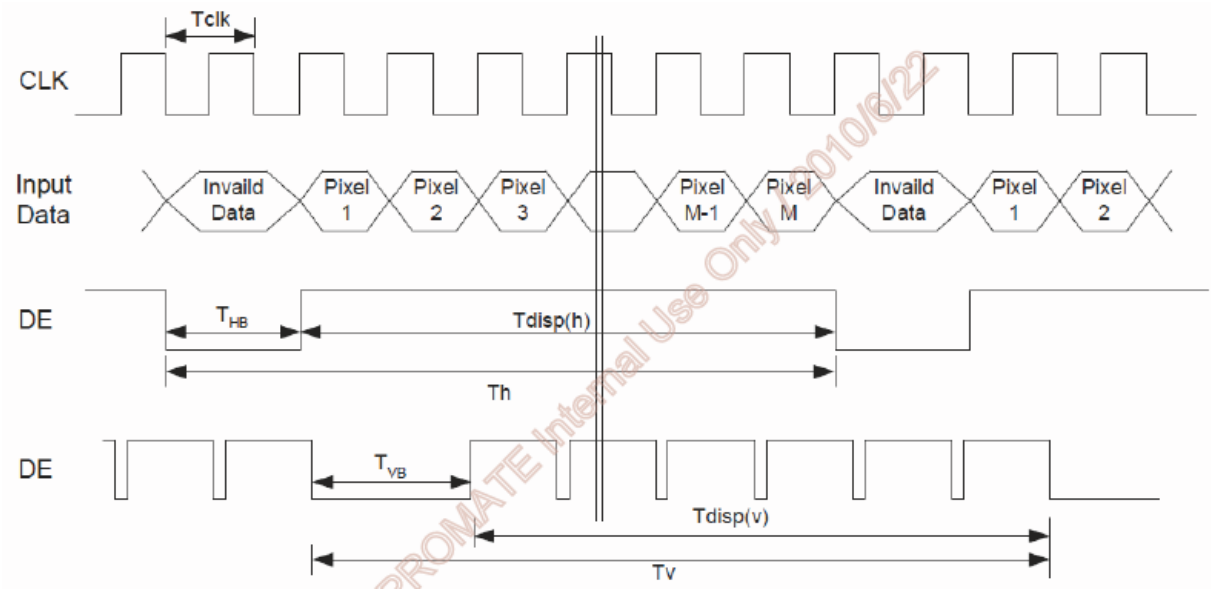
4.0 TIMING Characteristics

Signal		Symbol	Min.	Typ.	Max.	Unit
Clock Frequency		1/ T_{Clock}	50	65	80	MHz
Vertical Section	Period	T_V	776	806	1023	T_{Line}
	Active	T_{VD}	-	768	-	
	Blanking	T_{VB}	8	38	255	
Horizontal Section	Period	T_H	1054	1344	2047	T_{Clock}
	Active	T_{HD}	-	1024	-	
	Blanking	T_{HB}	40	320	1023	

Note 1: Frame rate is 60 Hz.
Note 2: DE mode.

Input Timing Diagram



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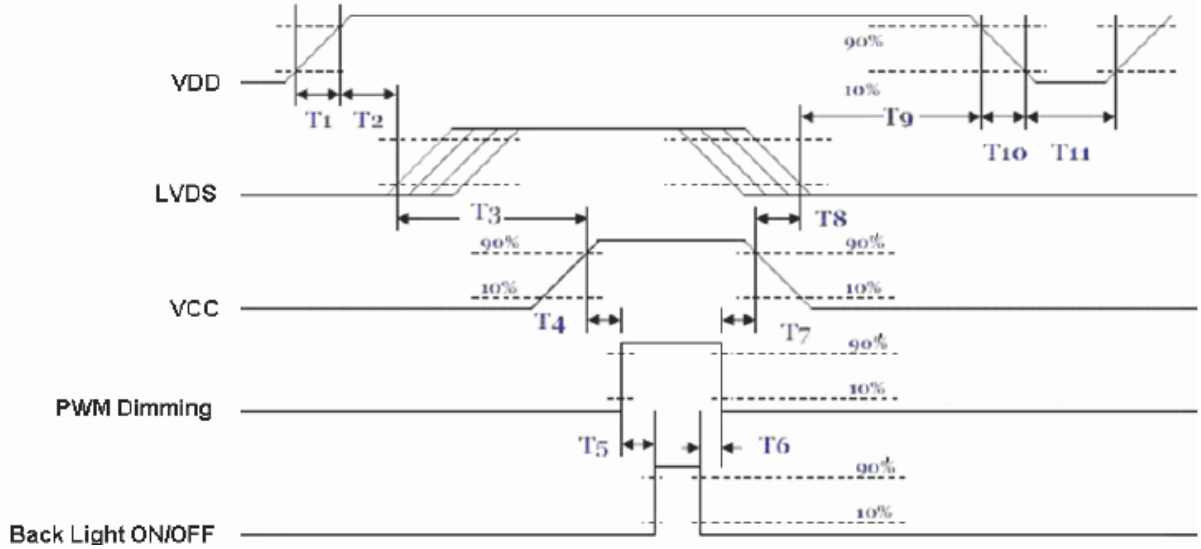
Power ON/OFF Sequence

VDD power and LED on/off sequence is as follows. Interface signals are also shown in the chart. Signals from any system shall be Hi-Z state or low level when VDD is off.



Power On/Off Sequence Timing

Parameter	Value			Units
	Min.	Typ.	Max.	
T1	0.5	-	10	[ms]
T2	30	40	50	[ms]
T3	200	-	-	[ms]
T4	10	-	-	[ms]
T5	10	-	-	[ms]
T6	0	-	-	[ms]
T7	10	-	-	[ms]
T8	100	-	-	[ms]
T9	0	16	50	[ms]
T10	-	-	10	[ms]
T11	1000	-	-	[ms]

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5.0 CONNECTOR and PIN ASSIGNMENT

Physical interface is described as for the connector on module. These connectors are capable of accommodating the following signals and will be following components.

TFT LCD Module

Connector Name / Designation	Signal Connector
Manufacturer	STM or compatible
Connector Model Number	MSB240420-E or compatible
Adaptable Plug	P240420 or compatible

PIN ASSIGNMENT

Pin No.	Symbol	Pin No.	Symbol
1	VDD	2	VDD
3	GND	4	SEL68
5	RIN0-	6	RIN0+
7	GND	8	RIN1-
9	RIN1+	10	GND
11	RIN2-	12	RIN2+
13	GND	14	CLKIN-
15	CLKIN+	16	GND
17	RIN3-	18	RIN3+
19	RSV	20	NC/GND

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6.0 OPTICAL SPECIFICATION

Item		Symbol	Condition	Data	Unit
Color chromaticity	Red	Rx	θ x=0 θ y=0 BM-7	0.636	-
		Ry		0.349	-
	Green	Gx		0.349	-
		Gy		0.607	-
	Blue	Bx		0.145	-
		By		0.058	-
	White	Wx		0.324	-
		Wy		0.350	-
Center Luminance of White		Lc		1600	cd/m²
Uniform		Lu		84.5	%
Contrast Ratio		CR	θ x=0 θ y=0 Klein K-10	700 : 1	-
Color Saturation		NTSC		75.8	%
Viewing Angle	Horizontal	θ x+	CR≧10	80	Deg
		θ x-		80	
	Vertical	θ y+		80	
		θ y-		80	

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7.0 LED DRIVING BOARD SPECIFICATIONS

1.LED (Application)

This specification is applied to LED converter unit for DLF/DLH1268(1600 nits) LED backlight

2 Operating Characteristics

Item	Symbol	Conditions	MIN.	TYP.	MAX.	Unit	Remark
Input Voltage	Vin		10	12	14	V	DC
Input Current (Low Brightness)	IinL	VIN=Input Voltage, Vadj=5V	0.0	-----	-----	A	
Input Current (High Brightness)	IinH	VIN=Input Voltage, Vadj=0V	0.93	0.77	0.66	A	
LED Current (Low Brightness)	IoutL	VIN=Input Voltage, Vadj=5V	0.0	-----	-----	Arms	
LED Current (High Brightness)	IoutH	VIN=Input Voltage, Vadj=0V	0.423	0.423	0.423	A	
Working Frequency	Freq	VIN=Input Voltage, Vadj=0V	539.55	545	550.45	KHZ	
PWM Frequency	Freq	VIN=Input Voltage	180	200	220	HZ	
Brightness Control(PWM)	Vadj	Connection of Voltage	0.5	-----	4.8	V	DC
ON/OFF Control	Von/off	Normal Operation	1.5	-----	5	V	DC
Output Voltage	Vout	VIN=Input Voltage, Vadj=0V	20.249	20.246	20.246	V	DC
Efficiency	η	VIN=Input Voltage, Vadj=0V	92.10	92.68	92.68	%	Note 1

Note 1:Efficiency=[(IoutH* Vout)/(IinH* Vin)] * 100%,Tolerance ±0.5%

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3.**Connector Socket**

3-1. Input Connector : Input Connector :J3(JST S8B-PH-SM3-TB or Compatible):

:

PIN No	Symbol	Description
1	Vin	DC+12V
2	Vin	DC+12V
3	Vin	DC+12V
4	GND	Ground
5	GND	Ground
6	GND	Ground
7	Brightness	Brightness Control 5V~0V
8	Control	ON/OFF Control 0.8V(OFF) 2.0~5.0V(ON)

3-2 .Output Connector : J1,J2(JST S2B-EH or Compatible):

PIN NO	Symbol	Description
1	Output	LED High Voltage(+)
2	Output	LED Low Voltage (-)

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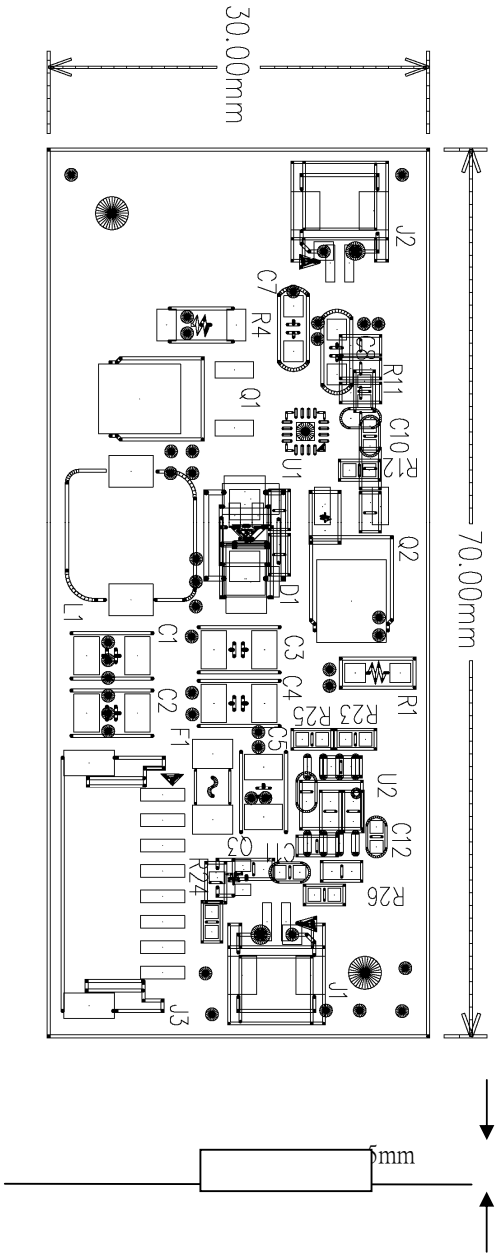
4. Mechanical Characteristics

Dimension: 70mm*30mm*5mm

INPUT CONNECTOR
J3:
- **PIN1:VIN**
- **PIN2:VIN**
- **PIN3:VIN**
- **PIN4:GND**
- **PIN5:GND**
- **PIN6:GND**
- **PIN7:BRIGHTNESS**
- **PIN8:ON/OFF**



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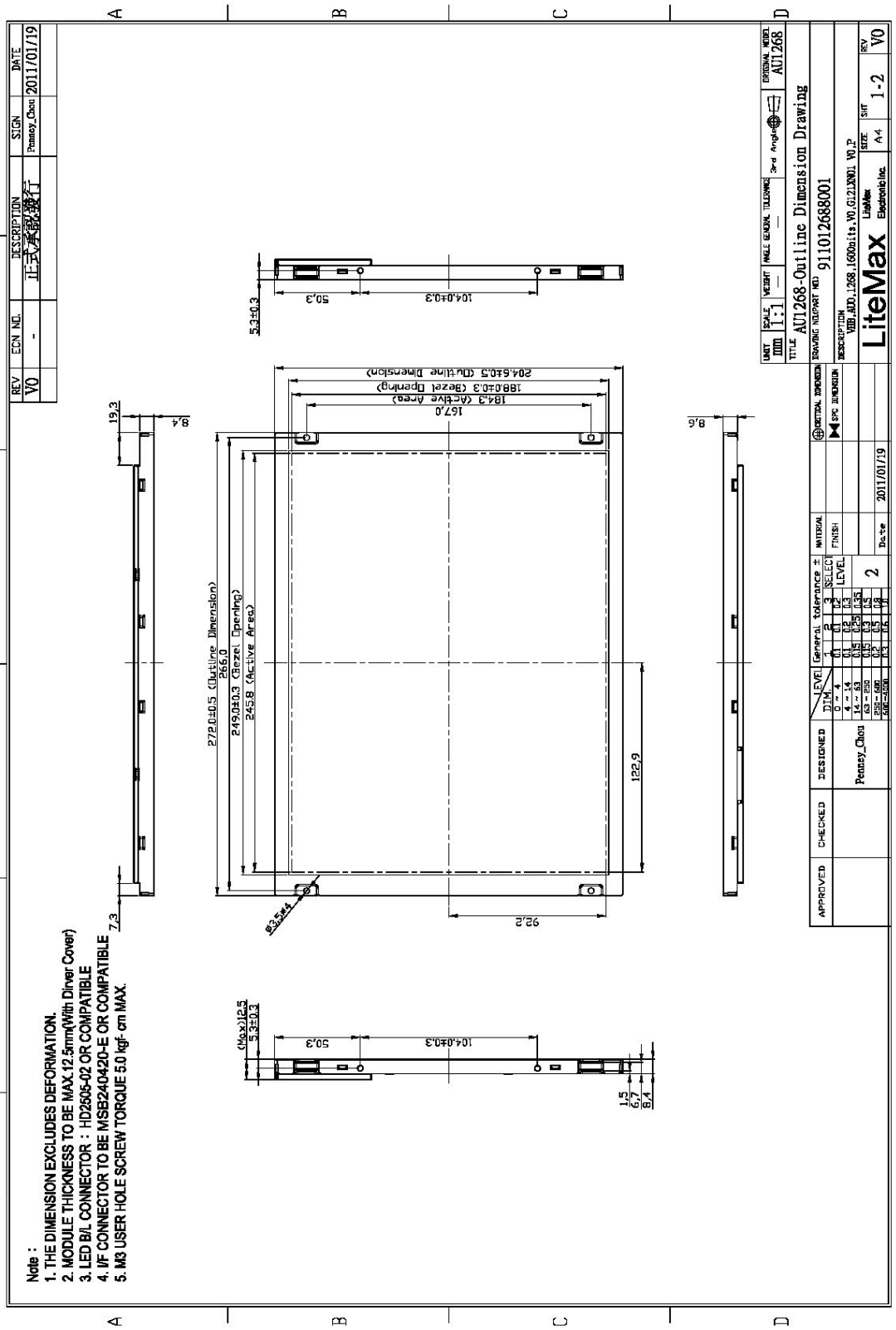
8.0 MECHANICAL DRAWING


Note :
1. THE DIMENSION EXCLUDES DEFORMATION.
2. MODULE THICKNESS TO BE MAX.12.5mm(With Driver Cover)
3. LED B/L CONNECTOR : HD2505-02 OR COMPATIBLE
4. I/F CONNECTOR TO BE MSB240420-E OR COMPATIBLE
5. M3 USER HOLE SCREW TORQUE 5.0 kgf- cm MAX.
AU1268-Outline Dimension Drawing
LiteMax
A4 297x210mm

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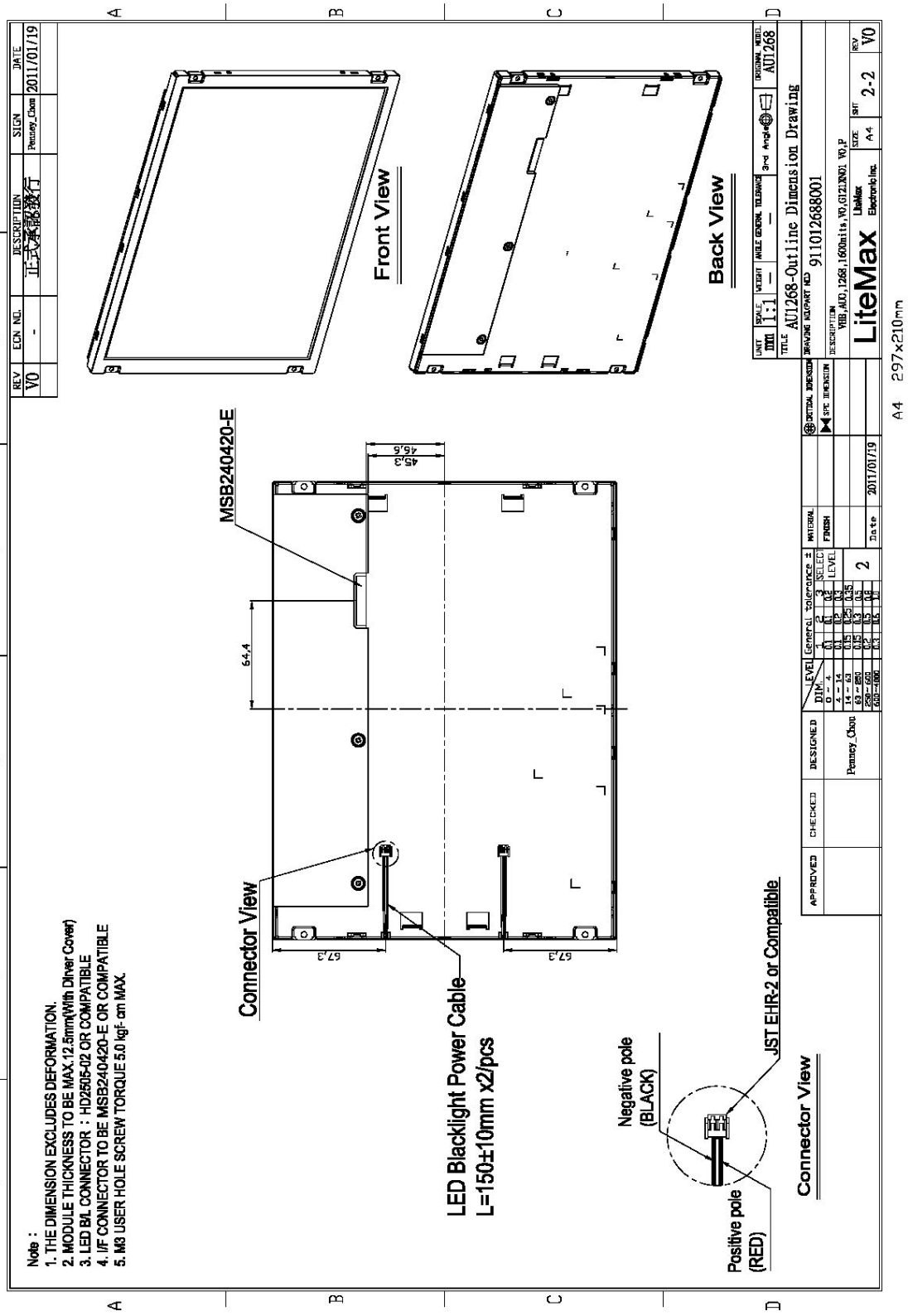

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9.0 PRECAUTIONS

HANDLING PRECAUTIONS

(1) The module should be assembled into the system firmly by using every mounting hole. Be careful not to twist or bend the module.
(2) While assembling or installing modules, it can only be in the clean area. The dust and oil may cause electrical short or damage the polarizer.
(3) Use fingerstalls or soft gloves in order to keep display clean during the incoming inspection and assembly process.
(4) Do not press or scratch the surface harder than a HB pencil lead on the panel because the polarizer is very soft and easily scratched.
(5) If the surface of the polarizer is dirty, please clean it by some absorbent cotton or soft cloth. Do not use Ketone type materials (ex. Acetone), Ethyl alcohol, Toluene, Ethyl acid or Methyl chloride. It might permanently damage the polarizer due to chemical reaction.
(6) Wipe off water droplets or oil immediately. Staining and discoloration may occur if they left on panel for a long time.
(7) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contacting with hands, legs or clothes, it must be washed away thoroughly with soap.
(8) Protect the module from static electricity, it may cause damage to the C-MOS Gate Array IC.
(9) Do not disassemble the module.
(10) Do not pull or fold the lamp wire.
(11) Pins of I/F connector should not be touched directly with bare hands.

STORAGE PRECAUTIONS

(1) High temperature or humidity may reduce the performance of module. Please store LCD module within the specified storage conditions.
(2) It is dangerous that moisture come into or contacted the LCD module, because the moisture may damage LCD module when it is operating.
(3) It may reduce the display quality if the ambient temperature is lower than 10 ºC. For example, the response time will become slowly, and the starting voltage of lamp will be higher than the room temperature.

OPERATION PRECAUTIONS

(1) Do not pull the I/F connector in or out while the module is operating.
(2) Always follow the correct power on/off sequence when LCD module is connecting and operating. This can prevent the CMOS LSI chips from damage during latch-up.

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